

ORAL PRESENTATIONS

- o Identification and feedback traceability of a meat cut, ideally, at the level of final selling point
- o Functioning of an electronic data base with unalterable and accessible to the consumer data

Additionally the same agency will be responsible for:

- o Developing and supervising the application, by its members, the regulations governing the internal functioning of the system
- o Training of its members for the in practice application of the system
- o The internal auditing of the system
- o Linking together, in an integrated way all participating units in the system.

In Fig. 1 the whole system is summarily illustrated.

Conclusion: Under these conditions the distribution of certified pork in the market, supported with accessibility of the consumer to all information stored in the data bank, operating by the agency functioning and supervising the system, will be recognized through its special trade mark in connection with the trade mark of AGROCERT. Further it is hoped that the product will enjoy premium prices.

References:

Commission of the European Communities, 2000. White Paper on Food Safety Brussels, January 2000.

EU regulation 178/2002 of the European Parliament and the Council, of 28 January 2002, laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety.

O 76 Reduction of *Salmonella choleraesuis* contamination in pork carcasses by vaccination

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Summary: *Salmonellosis* is a common clinical and subclinical infection of pigs. The species adapted serovar *S. choleraesuis* predominantly produces a septicemic disease in swine. Disease in other species, including humans, is rare compared to enteric type infections from non host adapted serovars such as *S. typhimurium*. However, when host adapted serovars infect alternate species, disease can be severe. Vaccination with an avirulent live *S. choleraesuis* vaccine, Enterisol® SC-54, significantly reduces prevalence and quantity of infection in pigs. Additionally, those pigs that remain culture positive have two logs or more reduction in the quantity of *S. choleraesuis* present. Vaccination of pigs as young as one day of age is successful. Where these infections are of concern in the human population, vaccination of pigs may provide dramatic reductions of the organism in swine, reducing risk in food items of swine origin.

Keywords: prevalence, vaccination, Enterisol® SC-54, control

Introduction: *Salmonella* infections in pork have been linked to outbreaks of food born disease in humans. Those practices that reduce the level of contamination or carriage of *Salmonella* in carcasses that arrive at abattoirs should assist in reducing contamination of post-harvest pork products. In some cases, *Salmonella choleraesuis*, a host adapted *Salmonella*, may play an important role in human disease. While typically a rare infection in humans, some countries report significant problems with *S. choleraesuis* infections in humans (Chui et al., 2002). In some areas, the prevalence of *S.*

choleraesuis may reach 5% or more of all *Salmonellae* isolated from human samples (Chui et al., 2002). When these isolates become resistant to primary treatment antibiotics, other methods for preventing exposure to people from the resident source, swine, may increase in importance. Challenge control studies were performed to gain USDA licensure of a live, avirulent *S choleraesuis* vaccine, Enterisol® SC-54 (Boehringer Ingelheim Animal Health GmbH). This vaccine was developed by serial passage through neutrophils. One of the mechanisms of attenuation was natural loss of the virulence plasmid, *vpl*, during passage (Roof et al., 1992). The vaccine is fully licensed as safe and efficacious by the USDA and numerous countries throughout the world. This paper summarizes data on reducing the prevalence of *S choleraesuis* by vaccination.

Materials and Methods: Pigs for challenge studies were selected from herds free of clinical signs of salmonellosis in the nursery. For each study, pigs were weighed and blocked by sex and weight into strict control (non vaccinated, non challenged), challenge control and vaccinated/challenged. Group sizes ranged from 10 to 20 pigs for each study group. Vaccine was administered either intranasally or orally, via drinking water, to mimic the natural route of exposure. Animals were housed in separate rooms prior to and during challenge to reduce exposure between groups. The interval from vaccination to challenge ranged from 14 days to 140 days. Pigs were monitored for 14 days following challenge for clinical signs and weight gain. All surviving animals were humanely euthanized at the end of the challenge period. Studies were performed both internally, and by independent laboratories (Baum, 1997).

Results: Data from studies comparing Enterisol® SC-54 to non vaccinated control pigs challenged with *S choleraesuis*. Various tissues were examined for presence (+/-) and quantity (log cfu/gm tissue) of the challenge organism. A biochemical marker was used to differentiate the vaccine from challenge strains. When pigs were vaccinated at three weeks of age or older, either intranasally or orally, via drinking water, pigs were clinically protected from challenge for at least 20 weeks following vaccination. Additionally, both the prevalence and quantity of *S choleraesuis* in internal organs were significantly reduced. Reduction of 1 log or more, and 50% lower rate of organ colonization was noted, all significant at $p<0.05$.

An additional efficacy study was performed in order to obtain a license to vaccinated pigs at one days of age. Cohort pigs were vaccinated intranasally at one day of age, three weeks of age, or left as strict or challenge control pigs. Challenge with 10^{10} virulent *S choleraesuis* occurred at 34 days of age. Pigs were monitored for 14 days following challenge.

As compared to both control and 21 day vaccinated pigs, the group of pigs vaccinated at one day of age had lower culture prevalence and cfu/gm of tissue of the challenge strain (Table one). Daily gain, temperature post challenge and mortality were nominally improved for one day vs. 21 day vaccination. All vaccinated pigs were significantly improved over control pigs. Organ protection from colonization was significantly improved for one day vaccinated pigs, as compared to both controls and 21 day old vaccinates, which performed consistently with prior studies.

Table 1. Summary of Clinical and Organ Colonization on *Salmonella choleraesuis* challenge

| | Challenge Controls | Day One | Day 21 |
|----------------------------------|--------------------|--------------------|--------------------|
| Mean Temp °C | 41.15 ^a | 39.94 ^b | 40.33 ^b |
| ADG (gm/day) | 254 ^a | 636 ^b | 617 ^b |
| 14 Day mortality | 70% ^a | 0% ^b | 10% ^b |
| % animals positive | 100% ^a | 10% ^b | 50% ^c |
| % organs positive | 73% ^a | 1.4% ^b | 10% ^c |
| Mean cfu/gm (log ¹⁰) | 3.45 ^a | 0.242 ^b | 0.689 ^c |

Means with different superscripts are significantly different ($p<0.05$)

Discussion: Immunization with an avirulent live *S. choleraesuis* vaccine has demonstrated consistent clinical and bacteriologic control of *S. choleraesuis* infections in swine. Clinical signs, including febrile response, diarrhea and mortality, along with growth rate, are significantly improved ($p < 0.05$). Pigs from one day of age and older may be safely vaccinated intranasally, or orally, via drinking water, against disease associated with *S. choleraesuis*, and to reduce the culture prevalence and shedding of other serovars of *Salmonellae* (Nolan et al., 2000). Additionally, levels of the organism are effectively reduced in vaccinated, challenged pigs. Fecal shedding of *S. choleraesuis* is significantly lower in vaccinated challenged pigs as compared to challenged control pigs. Organ culture prevalence is likewise dramatically lowered in vaccinated pigs. Vaccination at one day of age is at least as efficacious, and may offer even greater advantage over non vaccinated controls.

References:

Baum, D. (1997): PhD Thesis, Iowa State University

Chui, C-H, Wu, T-S, Su, L-H, Chu, C, Chia, J-S, Kuo, A-J, Chien, M-S, Lin, T-Y. (2002): The emergence in Taiwan of Fluoroquinolone resistance in *Salmonella enterica* serovar *choleraesuis*. *New Eng J Med* **346**, 413-419.

Nolan, D, Baum D, Fleck, R, Worstell, J, Kolb, J, Kahle, D. (2000): Use of Process Behavior Charts for the purpose of continuous improvement in swine production. *Proc Am Assn Swine Pract.* 219-224.

Roof, M., Kramer T, Roth, J, Minion F. (1992): Characterization of a *Salmonella choleraesuis* isolate after repeated neutrophil exposure. *Am J Vet Res* **53**, 1328-1332.

Roof, M., Doitchinoff, D. (1995): Safety, efficacy and duration of immunity induced in swine by use of an avirulent live *Salmonella choleraesuis* - containing vaccine. *Am J Vet Res* **56**, 39-44.

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Reduction of salmonella contamination in pork carcasses by vaccination

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Summary: Two field studies and one laboratory challenge were performed to evaluate of vaccination with a live, avirulent *Salmonella choleraesuis* vaccine (Enterisol® SC-54) to provide cross protection, reduce the level of internal culture and fecal shedding of multiple serovars of *Salmonella*. Barns of grow-finish pigs were vaccinated orally, via drinking water, or left as matched controls in the field studies. Ileocecal lymph nodes and spiral colon fecal material were collected at the abattoir from field studies. Three week old pigs were vaccinated intranasally and challenged at five weeks of age in the laboratory study. Internal organ culture and fecal shedding were measured two weeks following challenge with *S. typhimurium*. In all three studies, vaccinated pigs had significantly lower culture prevalence of non *S. choleraesuis* serovars ($p < 0.05$), and reduced fecal shedding in following laboratory challenge ($p < 0.05$). A nominal ($p = 0.07$) trend to improved growth rate following laboratory challenge with *S. typhimurium* challenge was also detected.

Keywords: prevalence, shedding, food safety, Enterisol® SC-54, performance

Introduction: *Salmonella* infections in pork have been linked to outbreaks of food born disease in humans, attracting attention to those strategies that may help reduce *Salmonella* in pork (Letellier et al., 2001). Those practices that reduce the level of contamination or carriage of *Salmonella* in carcasses that arrive at abattoirs should assist in reducing *Salmonella* contamination of post-harvest pork products. Enterisol® SC-54 (Boehringer Ingelheim Animal Health GmbH), an avirulent live *Salmonella*